

CLAIMS

1. A data storage device comprising:

a housing;

a storage medium;

a motor drive for moving the storage medium within the housing;

a transducer for accessing the storage medium;

an actuator for positioning the transducer with respect to the storage medium; and

noise reduction means integrated within the housing for actively reducing acoustic noise.

2. A data storage device as in claim 1, wherein the acoustic noise is generated by components within the housing.

3. A data storage device as in claim 1, wherein the noise reduction means comprises waveform generating means for generating a noise reducing waveform to counteract against the acoustic noise.

4. A data storage device as in claim 3, wherein the acoustic noise is in part generated external of the housing.

5. A data storage device as in claim 3, wherein the noise reducing waveform is out of phase to the acoustic noise.

6. A data storage device as in claim 5, wherein the noise reducing waveform is substantially 180° out of phase to the acoustic noise.

7. A data storage device as in claim 3, wherein the waveform generating means comprises transducing means for detecting the acoustic noise, and the waveform generating means generates the noise reducing waveform based on the detected acoustic noise.

8. A data storage device as in claim 7, wherein the noise reduction means comprises means to filter cyclical acoustic noise.

9. A data storage device as in claim 3, wherein the waveform generating means comprises stored noise reducing waveforms.

10. A data storage device as in claim 9, wherein the noise reducing waveforms are stored in at least one of RAM, PROM, ROM and the storage medium.

11. A data storage device as in claim 3, wherein the waveform generating means comprises means for generating a noise reducing waveform based on characteristic acoustic noise of moving components in the housing.

12. A data storage device as in claim 11, wherein the waveform generating means generates the noise reducing waveform based on characteristic acoustic noise of at least one of the motor drive and actuator.

5 13. A data storage device as in claim 12, wherein the waveform generating means further comprises stored waveforms, and the waveform generating means selects the noise reducing waveform from the stored waveforms based on characteristic acoustic noise of at least one of the motor drive and actuator.

10 14. A data storage device as in claim 13, wherein the waveform generating means includes a waveform generator.

15 15. A data storage device as in claim 3, wherein the noise reducing means further comprises means for reading a servo signal from the storage medium using from the transducer, wherein the waveform generating means generates a noise reducing waveform based on said servo signal.

16. A data storage device as in claim 15, wherein the servo signal is correlated to vibrations of at least one of the storage medium and actuator.

20 17. A data storage device as in claim 16, wherein the storage medium includes data representing one or more cyclical noise waveforms that are representative of the acoustic noise generated by the actuator and motor drive.

18. A data storage device as in claim 17, wherein the noise reduction means further comprises means for detecting drive signals applied to said one of the actuator and motor drive, and the waveform generating means generates the noise reducing waveform based on the detected drive signals.

19. A data storage device as in claim 18, wherein the waveform generating means retrieves corresponding stored cyclical noise waveforms based on the drive signals.

20. A magnetic disk drive system, comprising:

- a housing;
- a magnetic storage medium with a data surface of concentric data tracks positioned in the housing;
- a motor drive for rotating the storage medium within the housing;
- a slider including a read/write transducer maintained in operative relationship with the data surface when the magnetic storage medium is rotating;
- an actuator assembly coupled to the slider for pivotally positioning said slider relative to the magnetic storage medium to selected tracks on the data surface;
- noise reduction means for actively reducing the acoustic noise generated by components within the housing; and
- a control unit controlling the operations of components in the system.

21. For a data storage device comprising electro-mechanical components for positioning a transducer with respect to a storage medium, a method of reducing acoustic noise, comprising the steps of:

5 providing a noise reduction device within the storage device; and
actively reducing the acoustic noise.

22. A data storage system comprising:

a support structure;

10 a plurality of data storage devices supported by the support structure, each data
storage device comprises:

a housing;

a storage medium;

a motor drive for moving the storage medium within the housing;

a transducer for accessing the storage medium;

15 an actuator for positioning the transducer with respect to the storage
medium; and

noise reduction means integrated within the housing for actively reducing
acoustic noise, wherein the noise reduction means generates a noise reducing
waveform that counteracts in part acoustic noise generated by a source external of
20 the housing and present at the support structure.